CLAIMS

1. Apparatus for transferring data from a host system to one or more magnetic tape storage devices for retrieval if required by data retrieval apparatus, the apparatus comprising input apparatus for receiving said data and dividing it into a number of blocks of data, apparatus for adding to each of said blocks of data error detection/correction data to provide each block of data with a predetermined error detection/correction capability, at least one data writer for writing said blocks of data to said one or more storage devices, at least one data reader for reading back data written to said one or more storage devices and transferring said data from the at least one data reader to error checking apparatus, said error checking apparatus being arranged to determine whether or not there are any errors in a block of data and, if so, whether the number of errors exceeds a predetermined number, said error checking apparatus being further arranged to output a signal if the number of errors in a block of data exceeds said predetermined number and being configured such that said predetermined number may be one of a plurality of numbers between 0 and n, where n is an integer.

2. Apparatus according to claim 1, wherein said data retrieval apparatus includes error correction apparatus, and said error detection/correction data added to said blocks of data is such that it provides said data retrieval apparatus error correction apparatus with the capability to detect/correct up to X errors in a block of data, where X is an integer, the error checking apparatus being arranged to determine whether or not the number of errors in each block of data written to said storage means exceeds said predetermined number, and if so, to output a signal accordingly, wherein $n \leq X$.

3. Apparatus for transferring data from a host system to one or more magnetic tape storage devices for retrieval, if required, by data retrieval apparatus including error correction apparatus, the apparatus comprising input apparatus for receiving said data and dividing it into a number of blocks of data, apparatus for adding to each of said blocks of data error detection/correction data to provide said data retrieval apparatus error correction apparatus with the capability to detect/correct up to X errors in a block

of data, where X is an integer, at least one data writer for writing said blocks of data to said one or more storage devices, at least one data reader for reading back data written to said one or more storage devices and transferring said data from the at least one data reader to error checking apparatus, said error checking apparatus being arranged to determine whether there are any errors in a block of data and, if so, whether the number of errors in a block of data exceeds a predetermined number Y and, if so, to output a signal accordingly, wherein Y is an integer and $Y \leq X$.

4. An error processing unit, comprising input apparatus for receiving blocks of data, error checking apparatus for determining whether there are any errors in a block of data and, if so, whether the number of errors in said block of data exceeds a predetermined number, and output apparatus for outputting one of two signals indicating that the number of errors respectively exceeds or does not exceed said predetermined number, wherein said predetermined number may be one of a plurality of numbers between 0 and n, where n is an integer.

5. Apparatus according to claim 1, including the error processing unit of claim 4.

6. Apparatus according to claim 5, wherein n is an integer equal to the maximum number of errors which can be detected/corrected in each block of data as defined by said error detection/correction capability.

7. Apparatus according to claim 1, comprising control apparatus for receiving said signal output from the error checking apparatus.

8. Apparatus according to claim 7, wherein said control apparatus is arranged to rewrite a block of data only in the event that it contains more than said predetermined number of errors.

9. Apparatus according to claim 1, comprising a plurality of parallel tracks by means of which a number of blocks of data are simultaneously written across said one or more storage devices.

10. Apparatus according to claim 9, wherein said error checking apparatus comprises a number of parallel read heads for simultaneously reading back a number of blocks written to said one or more storage devices.

11. Apparatus according to claim 9, comprising eight parallel tracks.

12. Apparatus according to claim 10, comprising eight parallel read heads.

13. Apparatus according to claim 1, wherein said error checking apparatus is positioned such that it follows said at least one data writer and is arranged to read back data just written to said one or more storage devices, whilst data is still being written to said one or more storage devices.

14. Apparatus according to claim 7, wherein said control apparatus comprises a write chain controller (WCC) for controlling the order in which blocks of data are written to said one or more storage devices.

15. Apparatus according to claim 1 comprising a logical formatter for receiving data from said host system, compressing it, dividing it into a first set of blocks of data, and adding said error detection/correction data thereto.

16. Apparatus according to claim 13, further comprising a physical formatter for receiving the blocks of data from the logical formatter (whether directly or otherwise) and for adding header data to each of said blocks of data, said header data serving to identify said respective blocks of data.

17. Apparatus according to claim 14, wherein the write chain controller is arranged to write blocks of data sequentially to said one or more storage devices until a block of data is determined to contain more than a predetermined number of errors, in response to which said write chain controller is arranged to rewrite said block of data to said one or more storage devices prior to resuming sequential writing of said data thereto.

18. Apparatus for transferring data from a host computing system to one or more magnetic tape storage devices or the like, the apparatus comprising input apparatus for receiving data and dividing it into blocks, at least one data writer for writing said blocks of data in sets of a plurality of blocks to said one or more storage devices, at least one data reader for reading back data written to said one or more storage devices and transferring said read data to error checking apparatus, said error checking apparatus being arranged to determine if a block of data includes any errors and generate a positive output if the number of errors in said block of data is zero or does not exceed a predetermined number and/or a negative output if the number of errors in said block of data is greater than zero or exceeds a predetermined number, history store apparatus for storing information relating to at least some of the sets of data written to said one or more storage devices together with information corresponding to the output of said error checking apparatus for each block of data in a set, and apparatus for causing said at least one data writer to rewrite a set of blocks of data to said one or more storage devices if the output generated by the error checking apparatus and stored in said history store is negative for more than a predetermined number of the blocks of data and/or a predetermined number or density within a block or set of data, said apparatus for causing said at least one data writer to rewrite sets of data being configured such that said predetermined number or density may be selected according to user requirements.

19. Apparatus according to claim 18, wherein said at least one data writer for writing said blocks of data in sets of a plurality of blocks to said one or more storage devices comprises a plurality of tracks or channels, each of which is adapted to write a respective block of data of a set to said one or more storage devices.

20. Apparatus according to claim 19, wherein said respective tracks are adapted to write said blocks of data in a set to said one or more storage devices substantially simultaneously.

21. Apparatus according to claim 18, wherein said at least one data reader for reading back said data written to said one or more storage devices comprises at least one read head which follows the at least one data writer and is adapted to read data just written to said one or more storage devices whilst said data is still being written thereto.

22. Apparatus according to claim 19, wherein said at least one data reader comprises a plurality of read heads corresponding to said plurality of write tracks or channels, said at least one data reader being located so as to follow said at least one data writer and adapted to read data just written to said one or more storage devices whilst data is still being written thereto.

23. Apparatus according to claim 18, wherein each of said sets of data is identified in said history store by a plurality of bits of data, said bits of data comprising at least two quality bits relating to each block of data in a set.

24. Apparatus according to claim 23, wherein said row quality bits are set to '0' when the respective block of data is initially written to said one or more storage devices.

25. Apparatus according to claim 24, wherein each block of data comprises a header and two codewords.

26. Apparatus according to claim 25, wherein said error checking apparatus is arranged to determine if the header of a block of data contains an error and, if so, to set the respective row quality bits to '00'.

27. Apparatus according to claim 26, wherein, if the header of a block of data is determined to contain no errors, the error checking apparatus is arranged to determine if either of the codewords in the block of data contain an error and to set the row quality bits to '01' if both codewords are determined to contain one or more errors, to '10' if only one of the codewords in the block of data is determined to contain at least one error, and to '11' if both codewords are determined to contain no errors.

28.   Apparatus according to claim 27, comprising an N-bit look-up table which can be used to define the quality criteria by which a block of data is to be rewritten or not, wherein N is the number of combinations of 1's and 0's which can occur in the row quality bits for each block of data in a set.

29.   Apparatus according to claim 28, wherein two row quality bits are provided for each block of data in a set, the apparatus comprising a 16-bit look-up table to define the quality criteria by which a block of data is to be rewritten or not.

30.   A method for transferring data from a host system to one or more magnetic tape storage devices for retrieval if required by data retrieval apparatus, the method comprising the steps of receiving said data and dividing it into a number of blocks of data, adding to each of said blocks of data error detection/correction data to provide each block of data with a predetermined error detection/correction capability, writing said blocks of data to said one or more storage devices, reading back data written to said one or more storage devices, determining whether or not there are any errors in a block of data and, if so, whether the number of errors exceeds a predetermined number, and outputting a signal if the number of errors in a block of data exceeds said predetermined number, wherein said predetermined number may be one of a plurality of numbers between 0 and n, where n is an integer.

31.   A method according to claim 30, wherein said data retrieval apparatus includes error correction apparatus, and said error detection/correction data added to said blocks of data is such that it provides said data retrieval apparatus error correction apparatus with the capability to detect/correct up to X errors in a block of data, where X is an integer, the method including the step of determining whether or not the number of errors in each block of data written to said one or more storage devices exceeds said predetermined number, and if so, to output a signal accordingly, wherein $n \leq X$.

32.   A method of transferring data from a host system to one or more magnetic tape storage devices for retrieval, if required, by data retrieval apparatus including error correction apparatus, the method including the steps of receiving said data and dividing it into

6-21-

a number of blocks of data, adding to each of said blocks of data error detection/correction data to provide said data retrieval apparatus error correction apparatus with the capability to detect/correct up to X errors in a block of data, where X is an integer, writing said blocks of data to said one or more storage devices, reading back data written to said one or more storage devices, determining whether there are any errors in a block of data and, if so, whether the number of errors in a block of data exceeds a predetermined number Y and, if so, outputting a signal accordingly, wherein Y is an integer and $Y \leq X$.

33. A method of error processing, comprising receiving blocks of data, determining whether there are any errors in a block of data and, if so, whether the number of errors in said block of data exceeds a predetermined number, and outputting one of two signals indicating that the number of errors respectively exceeds or does not exceed said predetermined number, wherein said predetermined number may be one of a plurality of numbers between 0 and n, where n is an integer.

34. A method according to claim 33, wherein n is an integer equal to the maximum number of errors which can be detected/corrected in each block of data as defined by said error detection/correction capability.

35. A method according to claim 30, wherein a number of blocks of data are simultaneously written across said one or more storage devices by a plurality of parallel write tracks or channels.

36. Apparatus according to claim 35, comprising the step of reading back simultaneously a number of blocks written to said one or more storage devices by a plurality of parallel read heads.

37. A method according to claim 30, comprising the step of reading back data just written to said one or more storage devices, whilst data is still being written to said one or more storage devices.

38.   A method of transferring data from a host computing system to one or more magnetic
tape storage devices or the like, the method comprising the steps of receiving data and
dividing it into blocks, writing said blocks of data in sets of a plurality of blocks to
said one or more storage devices, reading back data written to said one or more storage
devices and transferring said read data to error checking apparatus, determining if a
block of data includes any errors and generating a positive output if the number of
errors in said block of data is zero or does not exceed a predetermined number and/or
a negative output if the number of errors in said block of data exceeds a predetermined
number, storing in a history store information relating to at least some of the sets of
data written to said one or more storage devices together with information
corresponding to the output of said error checking apparatus for each block of data in
a set, and rewriting a set of blocks of data to said one or more storage devices if the
output generated by the error checking apparatus and stored in said history store is
negative for more than a predetermined number of the blocks of data and/or a
predetermined number or density within a block or set of data, wherein said
predetermined number or density may be selected according to user requirements.